

WHAT IS CLAIMED IS:

1. A rotary electric machine, comprising:
a slip ring disposed on a shaft of a rotor;
a brush that contacts the slip ring; and
a brush assembly that supports the brush and provides a slip ring cavity that encloses the slip ring, wherein the brush assembly defines a first passage communicating with an inside and an outside the slip ring cavity, the first passage having a first opening that opens in an axial direction of the shaft, and wherein the brush assembly defines a second passage communicating with the inside and the outside the slip ring cavity, the second passage having a second opening that opens in a radial direction of the shaft and is located on a different location from the first opening.
2. The rotary electric machine according to claim 1, further comprising a portion disposed along the first opening that prevents entry of a foreign substance into the first opening.
3. The rotary electric machine according to claim 1, further comprising a fan that cools the rotary electric machine, wherein the second passage has a higher pressure drop than that of the first passage, and wherein the second opening is located closer to an inlet of the fan than the first opening.
4. The rotary electric machine according to claim 1, wherein the second opening is located on a bottom region of the brush assembly when it is installed for usage.
5. The rotary electric machine according to claim 1, wherein the brush assembly includes a frame that supports the rotor, and wherein the frame defines the first and second passages.
6. The rotary electric machine according to claim 1, wherein the second opening is located circumferentially offset from the first opening.

7. The rotary electric machine according to claim 1, further comprising a fan that induces cooling air flow,

wherein the brush assembly further includes a bearing that rotatably supports the shaft and a frame that supports the bearing,

the frame defining a shaft hole in which the shaft is located and communicating with the slip ring cavity,

a bearing holder located around the shaft hole,

a narrower cooling air passage located on a radial outside of the bearing holder,

a wider cooling air passage located behind the bearing holder and being wider than the narrower cooling air passage, and wherein

the first passage is formed as a L-shaped passage comprising an axially extending hole penetrating the bearing holder to reach the wider cooling air passage and a radially extending groove formed on the bearing holder communicating between the shaft hole and the axially extending hole, and

the second passage is formed as a radially extending groove formed on the bearing holder communicating between the shaft hole and the narrower cooling air passage.

8. The rotary electric machine according to claim 7, wherein the slip ring is located on an outside the frame, and

wherein the brush assembly further includes a brush holder mounted on an outside of the frame that supports the brush,

a cover that surrounds the slip ring with the brush holder,

a rear cover that covers the brush holder and the brush cover and

sealing members disposed between the frame and the slip ring cover and between the slip ring cover and the rear cover.

9. The rotary electric machine according to claim 8, wherein the rear cover defines a third passage communicating between the inside and the outside of the slip ring.

10. The rotary electric machine according to claim 1, wherein the brush assembly further defines a third passage communicating between the inside and the outside the slip ring cavity, and further comprising a fan that induces cooling air flow from the third passage to the first and second passages through the slip ring cavity.

11. The rotary electric machine according to claim 10, wherein the third passage has more complex shape than that of the first and second passages, and the first passage has more complex shape than the second passage.

12. A rotary electric machine, comprising:

a slip ring disposed on a shaft of a rotor;

a brush that contacts the slip ring; and

means for enclosing a slip ring in a slip ring cavity;

intake means for taking air into the slip ring cavity;

first discharging means for discharging air from the slip ring cavity in a first direction at a first location;

second discharging means for discharging air from the slip ring cavity in a second direction different from the first direction at a second location different from the first location; and

means for inducing air flow passing through the slip ring cavity.

13. The rotary electric machine according to claim 12, wherein the second location is circumferentially offset from the first location.

14. The rotary electric machine according to claim 12, wherein the second discharging means discharges air downwardly.

15. The rotary electric machine according to claim 12, wherein the first discharging means discharges air in a radial direction.

16. The rotary electric machine according to claim 12, wherein the intake means provides an air passage being more complex than another air passage provided by one of the first and second discharging means.

17. The rotary electric machine according to claim 12, wherein the intake means takes air into an axial end of the cavity, and wherein the first discharging means and the second discharging means discharge air from another end of the cavity.